Training/Practice
Contemporary Issues in Cardiology Practice
A Novel Protocol for Very Early Hospital Discharge After STEMI

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ABSTRACT

Although the incidence of ST-elevation myocardial infarction (STEMI) is on the decline, management of patients who present with STEMI continues to require significant health care resources. Earlier hospital discharge in low-risk patients who present with STEMI has been an area of focus in an attempt to reduce health care costs. As a result, discharge within 48-72 hours after successful primary percutaneous coronary intervention has increasingly become routine practice. Moreover, the current COVID-19 pandemic has led to enormous pressure on health care systems to find ways to increase bed capacity, preserve resources, and reduce the risk of exposure to patients and health care workers. In response to this goal, the Ottawa Heart Institute has developed and implemented a novel Very Early Hospital Discharge (VEHD) protocol. The VEHD protocol is a simple, 4-step

RÉSUMÉ

Bien que l'incidence de l'infarctus du myocarde avec élévation du segment ST (STEMI) soit en déclin, la prise en charge des patients qui subissent un STEMI exige encore des ressources importantes en matière de soins de santé. La sortie d'hôpital précoce des patients qui subissent un STEMI, mais qui sont exposés à un faible risque, a retenu l'attention dans le but de réduire les coûts des soins de santé. Par conséquent, la sortie d'hôpital dans les 48 à 72 heures après la réalisation d'une intervention coronarienne percutanée primaire est en constante augmentation dans la pratique courante. De plus, la pandémie actuelle de COVID-19 a entraîné une énorme pression sur les systèmes de santé pour trouver des moyens pour augmenter le nombre de lits, préserver les ressources et réduire le risque d'exposition des patients et des travailleurs de la santé. En réponse à cet

Cardiovascular disease is the leading cause of death in North America. Although the incidence of ST-elevation myocardial infarction (STEMI) has been declining for several decades, STEMI still represents up to 40% of acute coronary syndrome presentations. In addition to a decline in the incidence of STEMI, there has also been a steady reduction in life-threatening complications and death. Most recently, the **Sa**fety and Efficacy of **F**emoral **A**ccess vs **R**ad**i**al for Primary Percutaneous Coronary Intervention in **ST**-**E**levation **M**yocardial **I**nfarction (SAFARI-STEMI) randomized trial showed 30-day mortality and major adverse cardiovascular event rates less than 1.5% and 4%, respectively.[1] Regional STEMI systems of care, early reperfusion with primary percutaneous coronary intervention (PCI), and

guideline-directed medical therapy have all contributed to this progress.[2,3] Nevertheless, providing care for STEMI patients from the time of presentation until hospital discharge is typically associated with significant health care expenditures.[4]

Because of these important health care expenditures—combined with improved patient outcomes—clinicians, researchers, and administrators have increasingly sought earlier hospital discharge (within 48-72 hours) in low-risk patients admitted with STEMI. Although same-day discharge after elective PCI in patients with stable ischemic heart disease is common practice, the precise timing of safe hospital discharge in patients admitted with STEMI remains somewhat controversial. This is because of the relative paucity of data to guide clinical practice. At our centre, low-risk patients admitted with uncomplicated inferior STEMI are routinely discharged 48 hours after presentation. This practice is supported by the results of a recent meta-analysis of more than 1500 STEMI patients treated with primary PCI across 5 randomized studies, which showed that there was no increased risk of mortality or hospital readmission among patients randomized to an early hospital discharge strategy (24 hours to 3 days).[5] Furthermore, the median length of hospital stay in

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algorithm designed to accurately and efficiently identify low-risk STEMI patients who can be safely discharged between 20 and 36 hours after successful primary percutaneous coronary intervention. When deemed eligible for VEHD predischarge tasks are completed by the treating medical and nursing team and the patient is discharged home. Follow-up is completed remotely via virtual care (48 hours, 7 days, 30 days), and in the outpatient cardiology clinic (4-6 weeks). Amid a worldwide COVID-19 pandemic we believe the VEHD protocol is a crucial step in maintaining exceptional quality of care, in terms of patient satisfaction and clinical outcomes, while concurrently decreasing the risk of nosocomial infections, and reducing resource utilization.

objectif, l'Institut de cardiologie de l'Université d'Ottawa a élaboré et mis en place le nouveau protocole VEHD (Very Early Hospital Discharge). Le protocole VEHD est un algorithme simple à quatre étapes conçu pour identifier avec précision et efficacité les patients ayant subi un STEMI exposés à un faible risque qui peuvent obtenir leur sortie d'hôpital en toute sécurité entre 20 et 36 heures après la réalisation de l'intervention coronarienne percutanée primaire. Lorsqu'ils sont jugés aptes à obtenir une sortie précoce de l'hôpital selon le protocole VEHD, l'équipe traitante (médecins et infirmières) termine les tâches à accomplir et le patient retourne à domicile. Le suivi est réalisé à distance par des soins virtuels (48 heures, 7 jours, 30 jours) et à la clinique de consultation externe en cardiologie (4 à 6 semaines). Au cœur de la pandémie mondiale de COVID-19, nous croyons que le protocole VEHD est une étape cruciale pour maintenir une qualité de soins exceptionnelle en matière de satisfaction des patients et de résultats cliniques, et qu'il permet de diminuer simultanément le risque d'infections nosocomiales et de réduire l'utilisation des ressources.

the aforementioned SAFARI-STEMI trial was 3 days, with minimal complications after discharge.[1] Finally, although not addressed in the most recent Canadian Cardiovascular Society STEMI guidelines, the European Society of Cardiology guidelines for the management of acute myocardial infarction recommend that low-risk patients, who underwent uncomplicated primary PCI, can be safely discharged home in 48-72 hours (class IIa).

The emergence COVID-19 has created a global pandemic which has placed enormous pressure on health care systems, resulting in hospitals with limited resources running significantly over capacity, and in many instances without access to essential medical and personal protective equipment. Managing this dilemma has required elimination of nonurgent hospital admissions, postponement of elective procedures, and several other measures directed at increasing bed capacity, preserving resources, and promoting infection control. Consequently, cardiovascular societies from around the world have strongly recommended that significant precautions be taken to minimize the risk of exposure to patients and health care workers, while simultaneously ensuring appropriate resource utilization. With this in mind, the University of Ottawa Heart Institute has designed and implemented a novel Very Early Hospital Discharge (VEHD) protocol, which is aimed to reduce hospital length of stay and free up limited hospital resources (Fig. 1).

The goal of the VEHD protocol is to accurately and efficiently identify low-risk STEMI patients who can be safely discharged between 20 and 36 hours after successful primary PCI. The algorithm was developed on the basis of studies that assessed clinical events in STEMI patients after early hospital discharge.[5] Eligibility is determined through assessment of demographic and clinical variables at the time of admission, procedural criteria, and postprocedural clinical parameters. Inclusion criteria were chosen on the basis of the recommendations for early hospital discharge from the European Society of Cardiology, as well as from previously validated risk stratification scores. Before implementation, the algorithm was validated using the University of Ottawa Heart Institute STEMI database. Briefly, among a total of 4399 patients

referred for primary PCI between 2004 and 2015, the rates of in-hospital death or major cardiovascular events—a composite of death, reinfarction, or stroke—were 5.1% and 6.9%, respectively. When applying the VEHD algorithm, the rates of death or major cardiovascular events were, predictably, much lower in the remaining 1721 patients (39.1%) at 0.29% and 0.70%, respectively. In this very low-risk cohort, only 1 patient died within 30 days of hospital discharge. The median length of the index hospital stay was 4 days for the entire group vs 3 days for the very low-risk group.

The VEHD protocol is a very simple 4-step system designed to ensure safe discharge home with all necessary guideline-directed medications, adequate predischarge education, and appropriate outpatient follow-up. Step 1 begins with ensuring that the patient meets all required eligibility criteria as detailed in Figure 1. Step 2 involves enrolling the patient in the VEHD program and completing all of the predischarge tasks. Specific predischarge tasks are assigned to either the attending physician/primary medical team or the patient's nurse. When all of these tasks have been completed and signed-off in the electronic medical record the patient can be discharged home. In step 3 a trained telehealth nurse will perform follow-up phone calls with the patient at 48 hours, 7 days, and 30 days after discharge to assess for postprocedural complications, confirm medication tolerance/adherence, counselling, and answer questions. Finally, in step 4 the patient will complete the VEHD program through an outpatient clinic visit—either in person or virtually—with the interventional cardiologist who performed the procedure. All patients enrolled in the VEHD program are prospectively followed until the time of their cardiology clinic visit as part of a quality assurance initiative.

The past several months have forced health care systems across the globe to reevaluate current methods for delivering care, and in many cases have revealed inefficiencies in our current systems. Although the COVID-19 pandemic was the impetus for introducing the VEHD protocol, the available literature, in addition to our initial data, suggest that this change might enable clinicians to maintain exceptional quality of care—in terms of patient satisfaction and clinical
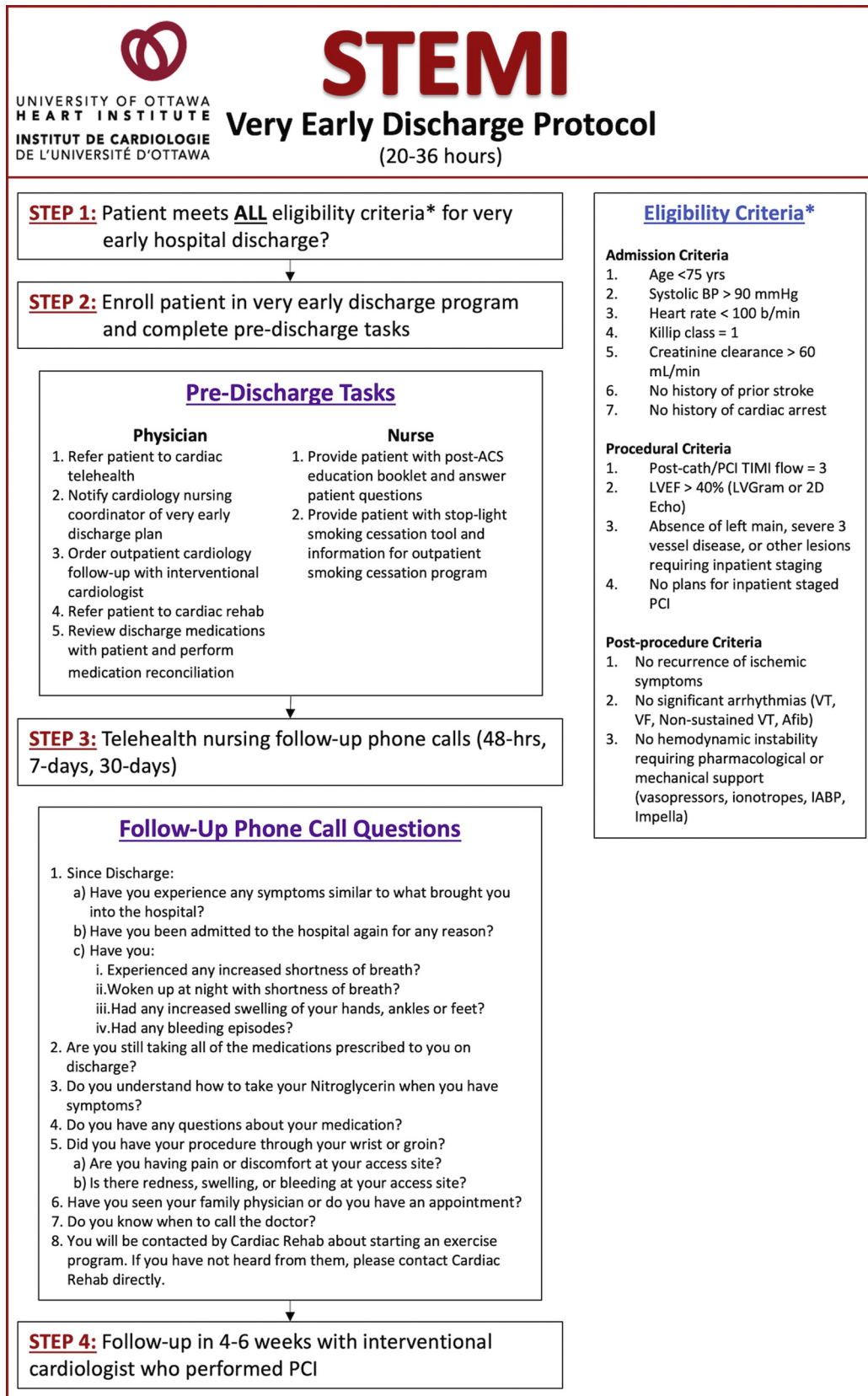
Figure 1. Very Early Hospital Discharge protocol. ACS, acute coronary syndrome; Afib, atrial fibrillation; BP, blood pressure; IABP, intra-aortic balloon pump; LVEF, left ventricular ejection fraction; LVGram, left ventriculogram; PCI, percutaneous coronary intervention; STEMI, ST-elevation myocardial infarction; TIMI, **T**hrombolysis **i**n **M**yocardial **I**nfarction; VF, ventricular fibrillation; VT, ventricular tachycardia.

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outcomes—while simultaneously decreasing the risk of nosocomial infections, and reducing resource utilization.

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